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North Carolina

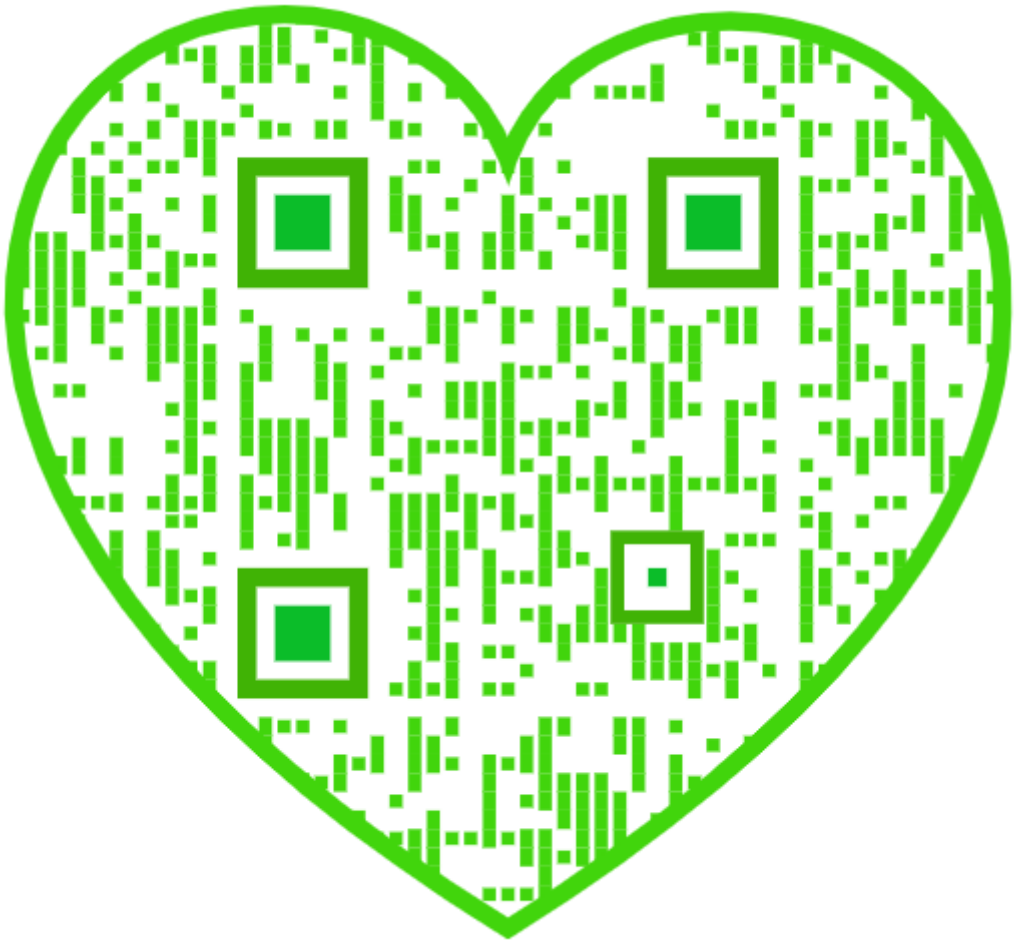
Conditions Inviting,

Farming, Trucking,

Cattle Raising and Dairying.

Soils and Climate

Department of Agriculture
Raleigh.



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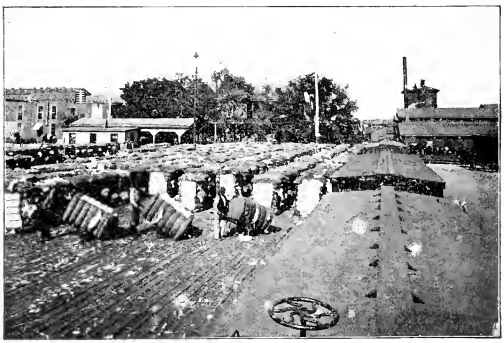
COTTON IN THE FIELD

AND IN THE BALE.



AFTERMATH.

FARMING.

North Carolina is essentially an agricultural State. While she has developed in manufacturing in the last decade more than any other State in the Union, the increase in this line having been over 800 per cent, the greatest increase is in cotton manufacturing, which is largely due to the fact that the farmers of the State are largely engaged in the culture of this staple. To the large area in tobacco, too, is due the great development of the State in the manufacture of tobacco, and her unequalled forests of hardwoods have tended to the building up of a great wóodworking industry.

Hence we come back to the soil as the source of the wealth and development of North Carolina. There is no State in the Union, unless we except California, which has such a varied series of crops, owing to the great range of climate. Lying largely on the great undulating plain sloping from the mountains to the sea, and from the greatest elevation east of the Rockies down to the coast plain but little elevated above the sea-level, North Carolina greets the rising sun, and her climate varies according to the elevation. On the high plateaus of the northwestern part of the State we find a grass and grazing section with cattle on a thousand hills, and the forest growth of white-pine, hemlock, and fir resembling Canada. Dropping over the great escarpment of the Blue Ridge, we reach the undulating region of the piedmont country, which in this State is again divided into upper and lower piedmont by a range of hills a hundred or so miles east of the Blue Ridge and forming the falls of the rivers with wonderful water-powers. This section lies in a series of rolling uplands, intersected by the rivers with their fertile bottomlands and rising from 700 to 1,500 feet elevation at the foot of the Blue Ridge. East of the Uwharrie Mountains and the Occoneechee Hills there is still the same rolling upland extending eastward till it drops off into the level coastal plain which extends inward for more than a hundred miles from the ocean. This lower piedmont, from its lesser elevation, has a milder winter climate than the upper piedmont, and the upper piedmont is far warmer in winter than the mountain region between the Blue Ridge and the Great Smokies that separate the State from Tennessee. As we reach the lower coast we find that instead of the white-pines and hemlocks of the high mountain plateaus and valleys, we have the first touch of the Floridian vegetation in the cabbage-palms which tower among the other evergreen growth on Smith's Island at the mouth of the Cape Fear River. This wide-stretching area from the white-pine to the palms shows the wonderful variety of climates which the State possesses, and accordingly indicates her adaptation to the crops of the North and the South. The grassy uplands of the mountain country

are as well adapted to the grazing of cattle as any part of the country, while the abundant food crops of the piedmont section offer the greatest opportunities for the winter feeding of these mountain-raised cattle. Over a very large section of the piedmont and coast regions the cotton crop has long been the chief interest of the farmers, and when grown in good farming there is no money crop in the United States that can equal it for average profit. True, it has been allowed to too much absorb the attention of the farmers, and has been grown almost as a sole crop on too many farms. But there is a gradual awakening to the importance of good farming with cotton, and good farmers who have realized the importance of a good rotation of crops are finding out the value of such a rotation and are understanding that there are other crops that can be grown with profit as well as cotton, and that through the aid of these crops and the great clover of the South, the cow-pea, they can grow cotton with a greater yield per acre, and can get just as much cotton on a smaller area as they could from the larger under the old system of merely planting cotton.

There is too much of a tendency among farmers coming here from the North to ignore cotton and to go into other crops to the exclusion of cotton. Northern men coming South are too apt to attribute the worn and wasted condition of much of the upland soil to the cultivation of cotton, and they imagine that cotton is a very exhaustive crop, while the very reverse is true, for, so far as the lint is concerned, there is no crop grown that draws so lightly on the fertility of the soil as cotton, and when the seed are properly applied to the rational feeding of cattle and the return of the manure to the soil in a good rotation of crops, there is no crop with which the land can be more rapidly improved than in the cultivation of cotton. No good farmer, coming to a new location, can afford to ignore what has been long proved to be the best money crop of the section.

The same remarks will apply to the northern counties east of the Blue Ridge, where the tobacco crop has long taken the place of cotton. Single cropping with tobacco is as bad as single cropping with cotton, and rotative farming and the improvement of the land can be done as well with tobacco as the money crop as with cotton.

The greatest development in the cultivation of the soil has been made in the coastal plain, where immense areas are now devoted to the production of early vegetable crops for the Northern market and the growing of strawberries and other small fruits. The truckers of the eastern part of the State are the most progressive cultivators we have, and they are annually improving their production and adopting intensive methods with protection and artificial heat during the winter months for the production of crops ahead of the natural season. With a soil unsurpassed for the purpose and a climate that makes it easy to produce extra early crops, the business has prospered and is increasing annually. But there is room in all parts of the State for

the general farmer in wheat, oats, grasses and cattle, and for the fruit-grower in the long-leaf pine country who wishes to grow peaches on a large scale, while the mountain country is destined to be soon recognized as the greatest apple section of the United States. In the following pages we will treat of the various crops and the regions of the State best suited to them.

WHEAT.

The soil surveys of the Department of Agriculture in Washington have demonstrated that our upland red-clay soils are practically identical with the best wheat soils in the country. They call the red-clay "Cecil Clay," from the fact that they first met with it in the northern part of Cecil County in Maryland, where on it the finest crops of wheat and grass produced in this country are grown. Cecil County hay is the standard hay in the Baltimore market. That this red clay here is capable of making as good crops of wheat here as in Maryland has been abundantly proved, though the general neglect of wheat for exclusive cotton growing has led people to think that wheat is hardly worth attention as a sale crop. This impression is due, not to the land, but to the kind of farming that has been done. All the rolling uplands of the piedmont section (and this means the greater part of the State) are admirably adapted to wheat growing, clover, and the feeding of cattle. One Ohio farmer who came to the piedmont country from the blue-grass, said recently that he has better summer pasture here than in Ohio, since the blue-grass dries up in the summer heat, while here the natural growth of the Japan clover, that has spread all over the piedmont country, is at its best in the hot summer weather, and cattle thrive on it as they do not on the blue-grass at that season. This man is a large breeder of the Polled Angus cattle, and is well satisfied with his change. With a rotation consisting of corn, with all the home-made manure, followed by wheat, with simply a good application of the cheap acid phosphate, and the wheat followed at once with a crop of cow-peas for hay and the pea stubble prepared for cotton the next season, with a liberal application of fertilizer, and crimson clover sown among the cotton, the soil will rapidly improve, for then there will be a clover sod to plow under with the manure for the corn and the land will be in the best possible condition for the following wheat crop, and the peas after the wheat will not only give a large amount of valuable feed for stock, but the stubble will be the best possible preparation for the cotton crop. We know of one farmer, who is not in the best wheat section, but in the best cotton section, who has been practising this mode of farming, and last season (1904) he made 100 bales of cotton on 50 acres. Even at the price for cotton as we now write (about seven and a half cents per pound), what money crop can compare with cotton when produced in this way, for the value of the seed

will largely increase the value of the 1,000 pounds of cotton per acre, while the auxiliary crops of wheat, oats, and hay leave the cotton crop almost a free money crop. Wheat, therefore, should always enter into the rotation of a farm in the red-clay uplands of the piedmont section. In this same section there are broad river bottom-lands, such as those along the Yadkin and Catawba rivers, which have been for generations carelessly cultivated in corn only, but are among the best of wheat lands and can well be taken into the rotation suggested, and from their great natural fertility can soon be made to produce immense crops. In the years before the Civil War the white wheat of North Carolina was famous and the States north of us—as far north as Maryland—were in the habit of sending here for seed wheat. Since the war the exclusive devotion to cotton as the only means for recovering the losses of the war has led to the neglect of the wheat crop. But the piedmont soils are naturally as well adapted to it as ever, and it only needs good rotative farming to demonstrate their capacity. While the coastal plain, with its lighter soils, is not so well adapted to wheat as the piedmont country, nevertheless good farmers have made fine crops of wheat in that section on the heavier soils. A few years ago Mr. Daughtridge of Edgecombe County, after harvesting a good crop of cotton, sowed wheat on the cotton land and made a crop of more than 30 bushels per acre. This would not be considered a poor crop by any means in the best wheat-growing sections of Maryland, where wheat is the main money crop. But in the coastal plain and on the lighter soil the crop that can more profitably take the place of wheat is

WINTER OATS.

From Pennsylvania southward there is no crop more uncertain than the spring-sown crop of oats, and in the South it is uniformly of little value, since the heat of summer strikes it before maturity and the grain is small and light. But with winter oats the case is different. They make their growth during the cool season of the year and mature before the hottest weather comes, and thus they keep up to and often above the standard weight per bushel, and under good culture yield large crops. Crops of 60 to 75 bushels per acre have been grown under good rotation conditions. While winter oats can be grown all over the piedmont country, wheat is there far more certain and profitable. But in the coast plain the reverse is true, and the oats should more generally be grown, except where soil conditions especially favor the wheat. The turning under of a crop of crimson clover on which the manure of the farm has been spread broadcast for corn, and the subsequent culture of the corn crop, makes the best possible preparation for the crop of winter oats. Early sowing is of great importance with this crop, and as the early planted corn can be cut easily here by the last of August and put into shock-rows, the

Wheat Harvest, Middle Carolina.

land can be disked and prepared so that the oats can go into the ground early in September. Sown at this time, they get well started and tillered before winter and will make in all the coast plain an abundant crop under good farming, and at the usual price for oats in the South will be found to be a profitable crop. As in the case of wheat, the land can at once be sown after harvest with cow-peas for hay and a crop of the finest hay for stock produced. Then if the acid phosphate and potash have been applied to the pea crop this crop will not only be largely increased, but will store still more fertility in the soil for the following crop of cotton, which in this case will need only a similar fertilizer, since the peas will leave abundant nitrogen in the soil. Then crimson clover following the cotton will again increase the capacity of the soil for the production of corn. Peas can also be well sown among the corn, but will have to be mown after the corn is cut in order that the land may be gotten into good shape for the oats. The best variety of oats is the one known as Virginia Grey Winter Turf Oats.

CORN.

Corn grows well in all sections of the State, though in the high mountain plateaus of the northwest section a quick-growing variety is needed, as in the North, for the farms there lie over 3,000 feet above the sea and are mainly devoted to grass. While south of what is called the "Corn Belt," we can grow all over the piedmont and coast regions as heavy crops as are grown anywhere. The scanty crops to be seen in various sections are due, not to the lack of capacity in the soil for the production of corn, but to the careless mode of cultivation. In some parts of the coastal plain there are deep peaty soils of wide area on which great crops of corn are grown year after year just as they are grown in the West. The traveler on the railroad leading from Norfolk, Va., to Edenton, N. C., seeing the widespread corn-fields and the black soil, could well imagine himself on the black lands of Illinois. And these lands are as well adapted to grass and stock as the lands of the West, and when properly farmed will be found among the most productive corn, oat, and grass lands that can be found, while the cotton and truck crops can be increased by the same good farming. These black soils naturally grow up in a great profusion of grasses as soon as left idle, and over half a century ago the late Edmund Ruffin wrote in the book on eastern North Carolina that in his opinion that coast section was destined to be the greatest stock country on the Atlantic coast, because of the wonderful profusion of native grasses. From Ruffin's day down the farmers have been engaged in killing grass for the single culture of corn or cotton. When the great swamps in the coast plain are finally drained and opened up, as sections of them have been, there will be found the greatest corn section of its size in the United States. All over cotton and tobacco sections corn has been looked upon merely in the

notion of "supplies" to enable the farmer to make more cotton or tobacco, and the idea of corn as a sale crop has never been considered except in the peaty reclaimed swamp land of the eastern section, where single farmers annually produce many thousands of bushels, one grower in the swamp country of Virginia, near the North Carolina line, shipping 40,000 bushels of corn annually. How many farmers in the great corn belt do this? The practice of the cotton growers in the piedmont section has long been to confine their corn to the fertile bottom-lands, while all the upland is devoted to the cotton crop. On the bottom-lands, of course, the superior fertility and moisture of the soil enables them to grow moderate crops of corn, but even on these lands the crop is not what it should be made if some system of rotation was practiced; and the fact that the uplands can be made to produce the largest of crops of corn has been abundantly demonstrated at the North Carolina College of Agriculture and Mechanic Arts, where on a natural upland soil a crop of 88 bushels of corn per acre was grown after but few years of rotative farming, and without any extravagant expenditure.

Since the raising and feeding of live-stock lies at the very foundation of successful farming, no matter what the money crop may be, it is evident that in any improving rotation in the State the corn crop must be one of the crops in the rotation, and the more of it that is fed on the farm to stock the greater will be the profit in the crop itself and the more it will aid in the improvement of the soil for the money crop through the manure made from the feeding.

Gradually, in various parts of the State, farmers are coming to realize the importance of the corn crop for the making of ensilage, and here and there, especially with those near the larger towns who are engaged in dairying, silos are being built and used, and with the silo of course come the stock to eat the silage.

Corn is especially the crop needing humus in the soil, and hence it succeeds best on the moist and fertile bottom soils and on the black, sandy, and peaty soils of the coast region. But with good farming in a rotation in which peas or clover come in frequently on the land, and are fed to stock and the manure applied to the cornfield, there is no part of the State in which large crops of corn cannot be grown. The long growing season, especially on the coastal plain, makes the special selection of seed for earliness needless. In fact, early varieties of corn are not so productive as the later kinds, and are not needed here except in the high mountain plateau of the northwestern section. It is a common practice all over the State to sow cow-peas among the corn at last working. These do not damage the corn at all and are of help to the soil, and, where no small grain is to follow the corn, crimson clover seed can be sown among the pea-vines, as the leaves fall in September, and will make, with the dead peas, an admirable green manure crop for cotton in the spring.

There is another advantage of the long growing season in the eastern coast plain. It is a common practice there to plant a crop of early potatoes or other early truck, that is shipped North in June, and then to plant a crop of corn or cotton which will fully mature, though in case of the cotton the planting must be done between the rows of the early truck before the crop is shipped, but the corn can be planted after the potato crop has been shipped and will make a fully ripe crop. Since the truck crop is very heavily fertilized, there is always a residual amount enough for a heavy crop of corn, and if peas are sown among the corn the land loses very little fertility. But as we have said, corn is essential in any good rotation of crops in any part of the State, and over the larger part it is far more certain than in what is called the corn belt of the Central West, where there is always a discussion as to the sufficient ripeness of the corn for seed, while in North Carolina, with no frost usually to check corn till late in October, and often into November, there is never any doubt about the full maturity of the seed corn. Where the corn is planted for the silo there is always time enough to get a crop of pea-vine hay from the same land, if the peas are sown among the corn at last working, and after the peas are mown the stubble is the best possible place for the small grain crops of wheat, oats, or rye, and, as a pea-vine hay crop can always be cut after the harvesting of a small grain crop, it will be seen that our climate gives us special advantages in the getting of two crops in a season. In the piedmont section we have known 75 bushels per acre of oats harvested and later in summer two tons per acre of the finest pea-vine hay made from the same land.

IRISH POTATOES.

Mr. Lindsay, who lives in Portsmouth, Va., but whose great plantation is in the drained area of the great Dismal Swamp, told recently the following anecdote: He said that recently there were several Northern farmers looking about that section for land. One of them asked Mr. Lindsay if the Irish potato could be grown there. He told them that he usually shipped not less than 10,000 barrels North. One of his hearers was so much surprised that he said: "My friend, my wife, when I left home, gave me a little hatchet to give to the man who could beat me lying. I am about ready to hand it over." He really thought that Mr. Lindsay was telling a very big yarn, when in fact he has frequently shipped thousands of barrels over the 10,000; and not only grows potatoes, but ships about 40,000 bushels of corn to Europe annually from his farm. The same soil that is found so productive of the Irish potato just over the Virginia line is found in greater areas in the coast country of North Carolina from the Dismal Swamp southward, and as earliness in this crop is a matter of great importance, the North Carolina growers have some weeks start of the Virginia planters. Some of the largest growers of

Irish potatoes in the United States are found in eastern North Carolina.

Mr. Makely of Hyde County, whose soil occupies a similar deep bed of black vegetable mold as that of Mr. Lindsay, plants from 400 to 600 barrels annually for the early market, and there are numerous growers who plant from 50 to 100 acres annually. The early potato crop is one of the crops of the great trucking section, and the methods of culture will be more fully treated of when we come to practices of the truck growers. In the eastern section the Irish potato is grown primarily as an early crop for the Northern market, and from seed of this early crop a late crop is grown for seed, for no truck farmer now depends on Northern seed potatoes for his crop. But in the plateau section in Henderson and Transylvania counties, and some other of the counties west of the Blue Ridge Mountains, there has grown up a great industry in the production of late potatoes and cabbages for the markets farther South, and great quantities of these are shipped every fall to Florida and other points in the lower South where they cannot so well be produced at that season. In these elevated mountain sections the climate approaches that of the Middle States, and the potatoes and cabbages are grown after the Northern fashion, and from their greater nearness to the Southern market the growers have a decided advantage over those farther North.

SWEET POTATOES.

The sweet potato in North Carolina is more of a general farm crop than the Irish potato. It is grown in all parts of the State, and while the varieties preferred in the North are produced to some extent by the market-gardeners of the eastern section, the greater part of the sweet potato crop is composed of the yam varieties that are preferred in the South to the dry Nansemonds which are used in the North, where people steam or boil them, a practice to which the softer yams will not submit. Northern people coming South always bring with them their preference for a dry sweet potato, but it takes but a short experience with the sugary yams to convince them that a well-baked yam potato is far superior in sweetness to the dry yellow potatoes they have been accustomed to. The lighter grey soils of the piedmont section and the sandy lands of the coast are the best soils for the sweet potato, and with good cultivation it is not hard to grow a good crop, even as much as 500 bushels per acre. They are bedded in early spring and the sprouts set later as in other sections. But for the best potatoes for winter preservation cuttings are made from the tips of the vines in July, and are set in the same way as the early spring plants, and if the ground is moist hardly a cutting will at that season fail to grow.

It has been found that these late potatoes, which are not so fully matured as those from the spring slips, will keep far better in winter.

How the Corn Grows in the Old North State.

For small potatoes to bed in spring for the growing of plants cuttings are made in August, about a yard long, and are planted in coils so that only the tip shows above ground. These coils make a mass of potatoes of small size, keep easily and are far more economical of space in the bed, and each makes as many sprouts as a larger one. Sweet potatoes are grown largely for the feeding of hogs, and for this purpose the most productive varieties, which are not so much esteemed for table use, are commonly used, such as the Peabody and the Hayman or Southern Queen. The hogs are turned into the field to dig the potatoes for themselves, and with this crop and some others harvested in the same way, as we will mention, pork-raising can be done more economically in North Carolina than in any of the great corn-belt States of the West. In fact, one large and successful farmer told us that the actual cost of his cured hams and bacon was four cents per pound. It is easy then to see that the raising of hogs and the curing of the meat can be made a very profitable industry in North Carolina. Far more home-grown bacon is now on the markets of the State than formerly, but there is still much of the packers' meat sold here, which could all be replaced by the home product to the profit of the farmer. Aside from their value as stock food there is in all the towns of the State a good market for the potatoes our people prefer, and there is also a good demand North for the varieties preferred there, and which can be more cheaply produced here than farther North.

CLOVER AND LEGUME CROPS.

In all the red-clay uplands and in the mountain country the red clover of the North thrives perfectly on the more improved lands. The annual crimson clover is grown with great success in all parts of the State, and in connection with the cow-pea makes a continuous winter legume crop after the summer growth of the pea. In all the State, and especially on the clay soils of the piedmont section, the Japan clover, *Lespedeza striata,* has spread over every vacant piece of land, and makes valuable pasture on lands useless for other purposes, since its best growth is made during the hot weather when the ordinary grasses are scorched by the sun.

Alfalfa thrives with the greatest luxuriance in all parts of the State, and it is rapidly becoming one of the most important of hay crops as its treatment becomes better understood. For soil improvement and the acquisition of nitrogen from the air the so-called Burr clover has been found very valuable, especially in the coast plain. This belongs to the same botanical genus as the alfalfa, and its burr-like seeds have been found to carry with them the bacteria for inoculating the soil for the alfalfa. Another valuable legume crop, which, like the Burr clover, will re-seed the land and bring another crop the following fall, is the Hairy Vetch, *Vicia villosa.* This vetch, sown with wheat or oats in the fall, makes a very valuable hay crop and is off the

ground in time to sow cow-peas for a second hay crop or to grow a crop of corn.

But the greatest of legume crops, and the one especially adapted to Southern conditions, is the so-called cow-pea, *Vigna catiang,* which in numerous varieties is grown all over the State. Some of the earliest varieties will mature two crops in one season on the same land. But the early sorts are not so large hay-makers as the later ones, and, as the season is long enough over the greater part of the State to mature any of them, the heavy growing sorts are to be preferred to the bush varieties. With the cow-pea the farmer of North Carolina can accomplish as much the same season after a wheat or oat crop is cut as could be done with red clover in two years, and for the rapid improvement of the soil and the production of heavy forage crops, either for hay or for soiling green, there are few crops that can compare with it. The great advantage that the Southern pea has over red clover is that it can be used in the starting of the improvement of a badly run-down piece of land, on which clover would hardly grow at all, for the pea will make a fair crop on land too much depleted to grow clover, and can be used for the purpose of getting it into condition in which clover and the grasses will thrive. But the cow-pea makes a hay of greater feeding value than red clover, and it is produced in such a short time that, except under peculiar circumstances in the upper districts, it should be used rather than clover, as it enables the farmer to make a short rotation and more rapidly bring up his land while growing increasing crops of the sale crop. It has been well called the "Clover of the South," and no farm rotation in North Carolina is good that ignores the cow-pea.

Another legume crop which has been found valuable, and which thrives in North Carolina far better than in the North, is the Japanese soja or soy bean. Many varieties of this, too, are grown, and in all the warmer parts of the State the taller-growing and later varieties are more valuable than the dwarf and early ones that succeed in the North. While hardly as valuable for the improvement of the soil as the cow-pea, the soy-bean makes a heavy crop of forage and is easily cured. It is also valuable for mixing with corn in the silo.

Melilotus alba, or sweet clover, grows spontaneously all over the State, and though considered more of a weed than anything else, it has the same capacity for improving the soil through the fixation of the free nitrogen from the air that other legumes have, and it has also been found that the soil where it grows becomes inoculated with the bacteria that live on the roots of alfalfa, and it can be used for inoculating land for the growing of alfalfa.

GRASSES.

No part of the country is better supplied with native grasses than North Carolina, and most of the grasses cultivated in the North thrive

equally well here. While timothy, the great hay-grass of the North, does not thrive well in the warmer parts of the State, it is perfectly at home in the high mountain valleys and plateaus west of the Blue Ridge Mountains. The traveler from the North passing through the cotton country and seeing none of the grass-fields he has been accustomed to at home, is apt to jump to the conclusion that grass does not thrive here. The fact is that the chief effort of the cotton farmers for generations has been to kill grass, and with the least neglect in the early stages of the cotton crop it becomes hopelessly "in the grass." The neglect of grass has been the greatest error in the farming of the cotton country, for it will certainly thrive, as has been abundantly proved, where an intelligent effort has been made to grow it. The statistics of the Census Bureau show that for ten years past the average hay crop per acre has been larger in North Carolina than in New York or Iowa. And, though hay sells for three or four times the price here that it does in Iowa, there is but a trifling amount grown as compared with Iowa. The greater yield here is not due to greater fertility of soil than Iowa, but to the greater rainfall and the longer season that permits more crops to be made. But as yet, with the exception of the fertile bottom-lands along the rivers and creeks, the southern upland country does not need grass, but does need the legumes for the improvement of the soil and the making of hay far superior in quality to any grass hay. But on any land here in good heart one can count on fair crops of hay from orchard grass, tall meadow oats grass, Italian rye grass, and the fescues.

For summer pasture we have the Bermuda grass, the finest of all the pasture grasses in a Southern climate. No grass in the North is more nutritious, and no grass grown in the North has the same capacity for growing in the hottest and dryest weather of summer. While a nuisance in the cultivated fields, no North Carolina farm should be without a permanent pasture of Bermuda. When mixed with Texas blue-grass the pasturage can be kept up through the year, as the Texas blue-grass is a winter-growing grass, while the Bermuda thrives only during the heat of summer. Both together make the ideal permanent pasture for North Carolina.

But our treatment of grasses would not be complete without mentioning the most valuable volunteer grass of the South—the crab-grass. Those who know crab-grass only as a pest in the North can hardly realize its value here. On the fertile lands of the market-gardens of the coast plain, after the early crops are shipped North, the growers who want hay have only to level the soil nicely and let it lie, and the crab-grass grows with a luxuriance that would astonish those familiar with its puny and weedy growth in the North. We were passing a luxuriant field of crab-grass in the trucking section a few years ago, when our companion remarked that that hay crop would constitute the fourth crop from the field that season. He said that the field had been set in early cabbage plants the fall before.

When the cultivation of the cabbages was completed snap-beans were planted between the rows and the cabbages were cut and shipped. The beans were gathered, and after the cabbage stalks had been plowed under between the rows, in each alternate row muskmelons were planted and the stripped bean-vines turned under; and as the vines of the melons spread so as to prevent cultivation the grass was allowed to grow, and its shade really helped the melons; and now there was on the land a growth of grass that promised two tons per acre of hay fully equal to the best timothy hay of the North. In fact, in nearly all parts of the State one can get as much hay without sowing a seed as can be had under the most careful culture in the North. It is this ease of living that has been responsible for a great deal of the careless farming in the South. In a limited section in Davie County we have been assured that 128 different species of grass have been collected, and in the black peaty soils of the coast plain the rank profusion with which grass grows on every vacant spot indicates well what could be done there with well-bred cattle. With the legumes that thrive in North Carolina as they thrive nowhere north of us, and the wonderful profusion of native grass, the State could in all its sections soon become a stockman's paradise if devoted to that. What is needed here is diversified farming and farmers who have been accustomed to farm systematically.

DIVERSIFIED FARMING.

This is the greatest need of North Carolina and of the whole South. Our people, left penniless after the war, were compelled to use every effort to get means. Cotton cultivation offered the readiest way, for on the cotton crop only could money be borrowed. Hence, with the aid of commercial fertilizers, they became a community of planters of cotton and tobacco rather than farmers, depending on the one crop for everything else, even for the mules that cultivated the crop, and for the meat that fed the hands. Northern farmers, seeing the ruin wrought by the constant cultivation of cotton year after year on the same land, are apt to imagine that cotton was the cause of this. Incidentally, of course, it was; but really the wasting of Southern soils has been due to the method and not to the crop. There is no crop grown that so readily fits into an improving rotation as cotton—at least, none that more readily does so, though the old idea was that cotton must always be a planter's and not a farmer's crop. But there is a very marked improvement, and the leaven of improved farming is working all over the State as people see the advantages of diversified and systematic cropping. The long dependence on commercial fertilizers for the growing of cotton has led our people to think that for every crop grown there must be some special fertilizer mixture, and one of the most important lessons to be learned is that with a good rotation of crops and the use of the legumes they can save more

than half the cost of the fertilizers while growing increased crops for sale.

INTENSIVE FARMING.

Possessing wide areas of land, the Southern people have been extensive planters rather than intensive farmers. The effort of the cotton planter was to see how many acres he could cultivate to the mule, rather than how much labor he could profitably expend on an acre. The growth of the market-gardening industry in the eastern section of the State has shown the value of intensive culture, and the market-gardeners are giving to the farmers lessons on the intensive cultivation of the soil. With acres and acres of land covered overhead high enough to work horses under, with iron pipes through which a steam-pump forces the water for the irrigation of the fields, and a cropping in winter and summer that keeps the land producing income during the entire year, which our climate allows, the truck farmers are second to none in the United States in the intensive use of their land. And, as we have intimated, something of this intensiveness is practicable in the greater part of the State by reason of the long season. The trucker of the east will plant cotton between the rows of his early potatoes on which he has been lavish in the use of fertilizers, and will get a crop of potatoes running up at times to 100 barrels per acre or more, and then a crop of more than a bale of cotton per acre. The strawberry grower takes two crops of berries from his land, and then he, too, plants cotton on the turned-under strawberry sod and makes a fine crop. Or, he may plant a corn crop after the strawberries are shipped and sow peas among it, and, after the corn is off, have the finest of pasture for stock. The cotton and grain farmer of the upper country sows peas after his small grain is harvested, and cuts the heavy hay crop the same season, and can leave the stubble sown with crimson clover for a hay crop the next spring in time to plant corn or cotton. In fact, the long growing season offers to the wise farmer opportunities for the intense cultivation of a few acres that cannot be had in a more northern climate. In this work of diversifying and intensifying the agriculture of the State, the College of Agriculture and Mechanic Arts at Raleigh, the Agricultural Experiment Station, and the Department of Agriculture with its test farms in various parts of the State, are all working with zeal and energy, and the new-comer to the State can always depend upon them for information and advice in the cultivation of the soil.

FRUIT CULTURE.

Owing to the great range of climate in the State of North Carolina there is a great range for the cultivation of the various fruits. Fruits of most sorts flourish in all parts of the State, but certain regions are better adapted than others to the production of certain fruits in a commercial way. Therefore, we will treat of each separately, taking first the small fruits as grown for home use and for market.

STRAWBERRIES.

So far as the growth and perfection of the fruit is concerned, there is no section of the State where the finest of strawberries cannot be grown. But in the cultivation of this fruit for market we must take into consideration the fact that the strawberry is grown commercially in all parts of the country, and that each section, from Florida to Maine, has its own season in the market. Hence, to make strawberries profitable for shipment North, they must be grown where the climate is early enough to put the product into the market before the localities north of us come in with shorter hauls and cheaper freight. Hence, in our high mountain country the crop will be anticipated by localities on the coast north of us, and the shipment could not be made profitable northward, though it may yet be possible to create a Southern market for the product of the mountain country, where the fruit can be grown in the greatest perfection. Present conditions, however, have confined the culture of the strawberry as a commercial crop to the lands of the coastal plain, where climate and soil combine to make the business a very profitable one. In fact, the first really fine berries sent North are those from Columbus County in this State. Of course, earlier in the season, strawberries come from Florida and other more southern sections, but there are none of them equal in quality to those produced in the counties of Columbus, Duplin, and Wayne, in North Carolina. From a small beginning but a few years ago the business of strawberry growing along the Atlantic Coast Line Railroad has increased to great proportions and thousands of carloads are annually shipped North. Chadbourn, in Columbus County, is a settlement of Michigan people who colonized there nearly twenty years ago, and who, by their energy and thrift, have developed a large business in strawberry and truck farming, and are reaping large profits. About the towns of Mount Olive and Faison, on the Atlantic Coast Line, the strawberry business had its first start, and the soil there has been found to be well adapted to the production of the finest fruit.

Great improvements have been made of late in the marketing of the strawberry crop. The fruit is now all sold at the stations for

In the Berry Fields.

cash to the Northern dealers, who distribute the cars to the various Northern markets, and this system has been found to be more satisfactory than when the individual growers shipped to commission merchants in the cities and took all the risks.

While strawberry growing is the leading interest in some sections, it is by no means the only culture, for in the same sections large crops of early Irish potatoes, green peas, and other crops are produced and shipped North. Then, too, the climate allows of much double cropping. For instance, between the rows of early potatoes, when the cultivation is completed, cotton is planted, and when the potatoes are dug in June the cotton cultivation goes on, and often very large and profitable crops of cotton are produced after a profitable crop of potatoes has been sold from the same land. In like manner the strawberry plantation is allowed to bear two crops, and is then plowed down, as soon as the second crop is gathered, and cotton planted at once on the land. Or, after the strawberries, a crop of peas can be sown and cut for hay in time to plant the same land in a second crop of Irish potatoes from seed of the early crop. This second crop is now used entirely for seed for the early crops the following season.

There is still much room for the development of the strawberry culture, for the demand for berries of high quality is always good and is annually increasing with the increase in population northward, and even with an excess there would be room for large canning establishments to compete with California in fruit packing.

While the coast region will always be the section where profitable strawberry growing for the Northern market will be carried on, the increase in the towns of the State makes home markets for a great deal of the fruit, and makes the culture of the strawberry profitable to many in all parts of the State who never ship a crate North. In fact, the home markets are apt to be overlooked and poorly supplied. The valley lands of the mountain section produce strawberries of the finest quality, and, as we have suggested, they may be the source for supplying a great trade with the far South in these berries or in canning them.

RASPBERRIES.

Raspberries, like strawberries, can be grown in every section of the State, but are far better adapted to the upper piedmont and mountain sections than to the warmer parts of the State. In the eastern section the raspberry will never be of commercial importance, since the climate is too warm for the largest crops and the fruit does not bear long transportation like the strawberry. In all the eastern and warmer sections the raspberry needs to be grown in the richest and most moist clay soils, and, while not needing winter protection as in the North, it needs shade and careful cultivation to carry the plants well through the long summer, and, with the red varieties, especially, the crop is not near so large as in the North and in the upper sections.

But in no part of the country does the raspberry thrive better than in the valleys and plateaus of the mountain country, where soil and climate combine to make it fine and productive. And in moist clay soils in the upper piedmont section the raspberry thrives finely and can be made profitable for the local markets.

DEWBERRIES AND BLACKBERRIES.

Our native dewberry is small, though early, but is never grown to any extent for market. But the larger form, the Canada dewberry, has been found to be among the most profitable of small fruits. The variety of the Canada dewberry known as the *Lucretia* is the only variety cultivated. While it is grown to some extent in the coastal plain, the section where the culture of dewberries has grown most is in the edge of the lower piedmont and mainly about the town of Ridgeway, a settlement of Northern people, where, on a red-clay upland in Warren County, dewberry culture has grown to large proportions and has proved profitable. The fruit goes into market before strawberries ripen in the North and makes a variety in the fruits on the market and usually brings a good price. In fact, the cultivation of the *Lucretia* dewberry is extending annually. Instead of, as formerly, training to wires, which were found to chafe and injure the canes, the running stems are now tied up in spring to stakes and the new canes are allowed to run on the ground during the first season, and are safer there in winter than tied up, so that the tying-up is not done till spring. After the crop is off the old canes are cut away and the new ones trailed along the rows out of the way of cultivation.

The later and upright-growing blackberries are also grown to a considerable extent and over a wider territory than the dewberry. In fact, there are numerous varieties of wild blackberries in all parts of the State from which as fine sorts as those in cultivation could be selected. This is particularly true of the mountain and upper piedmont sections, where blackberries of the finest quality grow so profusely that little attention has been given to their cultivation. The earliest blackberry grown for market is the Early Harvest, a rather small and sweet variety of wonderful productiveness, which comes in often before the dewberries are over. The finest fruit is from the Wilson, but some growers claim that, though the Wilson sells for a higher price, the greater productiveness of the Early Harvest will make it more profitable. Here, too, there is much room for growing dewberries and blackberries for the local markets, which are as yet not well supplied and depending very largely on the wild berries.

WHORTLEBERRIES OR BLUEBERRIES.

No attempts that we know of have been made to cultivate these, but the wild crop is of great commercial importance in some parts of the State, and in Sampson County the "Sampson Blues" have a great

reputation and form an important crop from the swamp lands, the shipment amounting to perhaps a hundred thousand dollars annually.

PEACHES.

Peaches are grown in all parts of the State, but commercially in only a few sections. Peaches of remarkably fine quality are produced in the upper piedmont section and on the dryer ridges in the mountain country. But little has been done in these sections beyond the supply of the local markets. Peach-growing on a large scale has developed mainly in the long-leaf pine section, the sand-hill country in Moore County, where immense orchards have been planted and where the business is increasing. In this section there has never been a total failure of the crop, and the peaches produced on these sandy soils are high-colored and of fine quality. Inasmuch as lands in that section are the lowest in price of any in the whole State, it would seem that with the railroad facilities, which are abundant, a large business should grow up in peach culture as well as in some other fruits. Those interested in peaches should visit the great orchards near Southern Pines, on the Seaboard Air Line Railroad, in the peach season, and note there the great development that is being made. As with other fruits, the later and finer peaches that can be produced in the mountain section should find a profitable market in the South.

PEARS.

Pears thrive well everywhere, but especially in the coast region and the upper piedmont and mountain sections. In all parts of the State the LeConte and the Kieffer, the hybrids, with the Chinese pears, thrive, and the Kieffer especially is a far better pear here than in the North. It grows here to a larger size and ripens more perfectly than northward, and for canning it should be made a very profitable fruit. Where proper care is given, all the finer pears thrive in the coast country and in the mountains, too, better than in the intermediate section. No finer pears are grown anywhere than those we have seen grown near the coast.

PLUMS.

Where properly cared for all the species of plums thrive in any section of the State. The finer European sorts demand higher culture and greater care in fighting the *curculio,* but they can be grown to perfection, while the native sorts, and especially the Japanese varieties, thrive in the greatest profusion and with the most ordinary care, and their shipment North can be made very profitable.

QUINCES.

In moist soils near the coast and in the moist lands of the mountain valleys quinces thrive well. In fact, they can be grown in any section, but their best locality is near the salt water and on land naturally moist. Commercially they are of less importance than other fruits, but in all parts of the State a home supply can be easily grown.

CHERRIES.

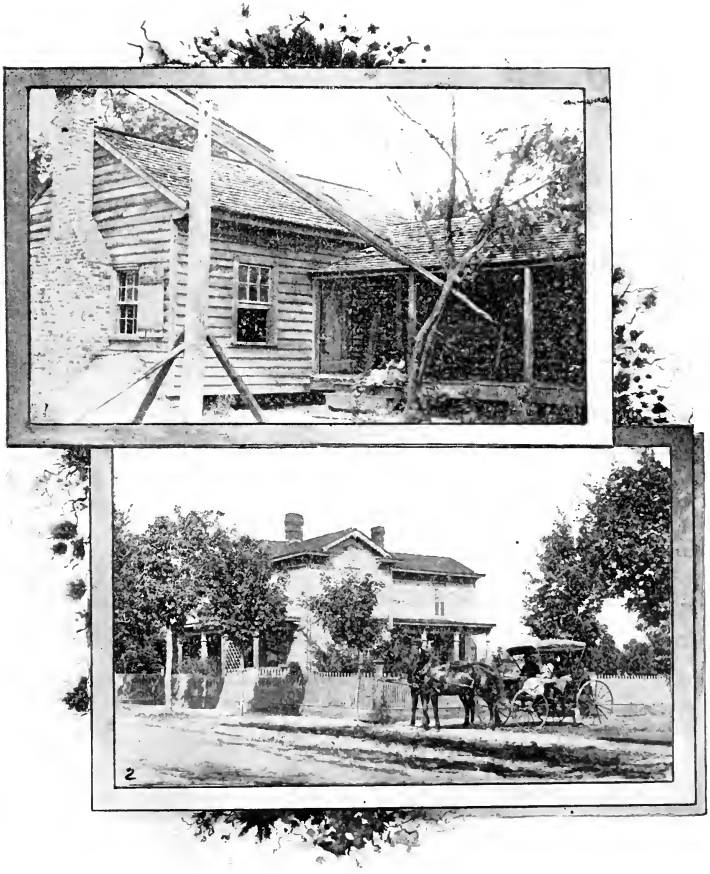
The finer sweet cherries cannot be grown to any extent in the warmer parts of the State. The trees grow and are perfectly healthy, but they fail to produce crops. The Morelloes and other sour cherries thrive all over the State, and the finer cherries thrive in great perfection in the upper piedmont and mountain sections, and cherries from the Brushy Mountains of Wilkes County have brought in the Northern markets prices but little less than the California product; and in that part of the State, if the crop is handled after the California style, the cherry ought to be made a very profitable crop.

GRAPES.

Grapes of all the cultivated sorts thrive in North Carolina in every section, and in all the warmer parts of the State the *Vitis Vulpina,* the class of grapes to which the Scuppernong belongs, thrives in greater perfection than it does in almost any other section of the country.

The varieties of the *Labrusca* and other cluster grapes, commonly cultivated northward, thrive well in every section, and it has been found that by grafting the European *Vinifera* grapes on the roots of these varieties they can be grown here in the open air with success, both in the mountain country and in the east. The largest commercial vineyards are in the long-leaf pine section in the neighborhood of Southern Pines, in Moore County. There the sandy soil seems to be well suited to the grape as well as the peach, and the Delawares and Niagaras grown there are unsurpassed in beauty and quality by the same varieties grown elsewhere.

Eastern North Carolina is the home of the Scuppernong and other varieties of the *Vulpina* class of grapes. Owing to the fact that they do not ship well, these grapes are almost unknown to the Northern people, and, being so different in character to those they have been accustomed to, it takes a Northern visitor some time to acquire a liking for them. But a little experience with this class of grapes soon makes the new-comer fond of eating them. It has been demonstrated that the Scuppernong is the finest wine grape in America to-day. The making of Scuppernong wine is on the increase as the proper management of the wine is better understood. The Garrett Company of Halifax County is now making many thousands of gal-



NOTE THE DIFFERENCE! DONE WITH STRAWBERRIES IN A FEW YEARS.

lons of the finest Sauterne and other classes of wines, and there is no reason why eastern North Carolina should not compete on even terms with California in the making of wine, and wine of a far better and lighter character than the wines of California.

ORCHARDING IN GENERAL.

Of course, the apple is the great orchard tree, and while apples can be grown with success in all parts of the State, the cultivation of winter-keeping apples on a commercial scale will always be confined to the mountain country west of the Blue Ridge and the more elevated lands in the upper piedmont section. In the mountain country apples have long been grown with great success, though with little attention on the part of the grower. The Cherokee Indians in the southwestern part of the State raised a great many apples from seed. Some of these have gotten into the nurseries and are esteemed, but there are still a great many of the old seedling apples in the mountain country which are worthy of cultivation. Apples have been grown in the mountain country in spite of almost absolute neglect, simply because of the admirable adaptation of the soil and climate to the apple. Some years ago there was a specially full exhibit of apples at one of the State Fairs, and three of the best judges of fruit in the country were selected to judge them. These were Professor Bailey of Cornell University, Mr. Taylor, who was afterwards superintendent of the horticultural exhibits at the St. Louis Fair, and Mr. Brackett, the Pomologist of the Department of Agriculture in Washington. Mr. Brackett declared that such fruit was grown only in two sections of the United States—North Carolina and the Ozarks of Missouri and Arkansas—and that North Carolina had the advantage not only of her position nearer the Eastern markets, but that her mountain soils are very fertile, while those of the Ozarks are very poor. With the extension of railroads into the mountain country and some liberality on the part of the roads in the matter of freights, the cultivation of apples will grow to an immense business in western North Carolina. Here and there large orchards are being planted and cared for in modern style, and the example of these will spread through the section.

MARKET-GARDENING WITH KITCHEN VEGETABLES.

The greatest development of late years in North Carolina has been in the production of early vegetables for the Northern markets in the eastern coastal plain, and in the production of late vegetable crops in the mountain section for the Southern coast markets. Both these two distinct lines of vegetable culture are growing, and the growers are intensifying their work and getting greater returns per acre than ever. Both the soil and climate of the coast plain are well adapted to the production of early vegetables, and with the adoption of frames protected with cloth or glass, and sometimes with steam-heating pipes, the production of crops in winter and early spring is carried on with great success, and large areas are now irrigated by means of pipes running overhead high enough to work teams under. With rapid transportation to the Northern cities by rail and water, the business of supplying early vegetables to the growing Northern cities is certain to increase beyond its present large proportions. The leading crops grown by the eastern market-gardeners are as follows:

IRISH POTATOES.

The Irish potato is one of the leading truck crops grown for the early market, and also as a second crop for the winter market and for seed. From the city of New Bern alone over 100,000 barrels of early Irish potatoes are shipped annually, and the crop in other sections is a very large one. One grower in Hyde County plants 600 barrels for the early crop, and from these he grows a second crop sufficient for his next year's supply of seed potatoes and many barrels to sell. The early potato crop is planted in February and goes to market in June. This gives time to grow a crop of pea-vine and crab-grass hay on the land and then have it ready to plant the second crop of potatoes from seed of the first crop in August. This second crop is dug in December and makes the best seed for the following spring, as the potatoes keep sound and unsprouted during the short time they are out of the ground, and grow with a vigor never found in the seed brought from the North.

In some sections it is the practice to plant cotton between the rows of early potatoes at the last working of the crop, and when the potatoes are dug and shipped the cultivation of the cotton is continued, and the heavy fertilization of the potato crop insures a heavy crop of cotton, too, and in this way, after shipping a profitable crop of potatoes, there is often a bale or more per acre of cotton grown. But, for the welfare of the truck crops, it is always better to follow the early crops with peas for hay. On the heavily manured soil the natural

Lettuce for Early Market, Wilmington to Fayetteville.

crab-grass grows rapidly in warm weather, and this, mixed with the peas, makes the best of hay, and the presence of the crab-grass makes it easier to cure the peas. In the mild winter climate of the coast country the late crop of potatoes can be piled in windrows and covered with earth. Some growers lift them when the early potatoes from Bermuda come in, and, being fresh from the soil, they sell as "New Bermudas" in New York, bringing from $2.50 to $5 per barrel.

CABBAGES.

The only cabbages grown for market in the coast trucking region are the early cabbages, which can be shipped North in March and April profitably. The variety used is generally the Early Wakefield. The seed are sown in early September and at intervals till October, so as to have plants just the right size to set the last of November or early December in the open field. The plants are set on heavily fertilized ridges, and it is important that the plants be just old enough and not too old, as the plants that have gotten too large in the fall may run to seed in the spring without heading. The cabbages are shipped in crates that hold about a barrel and are among the most profitable and largely grown crops of the market-gardens. There is another large cabbage interest in the mountain country, where the late summer and fall cabbages are grown and shipped in August and September to the Southern coast cities—Charleston, Savannah, and Jacksonville—where the climate is not favorable to the growing of the late cabbages. Several counties are engaged in this culture, the most extensive being in Henderson County. But in all the mountain counties the late cabbage crop is of great importance, as the climate there is more favorable to their growth than in the warmer parts of the State, and the eastern towns of the State furnish a market for a great deal of this cabbage. The late crop of cabbages in the mountain counties probably amounts to one hundred thousand dollars, while the early crop in the eastern part of the State will reach over half a million dollars in value.

LETTUCE.

This is now probably the most profitable crop grown by the truckers in the coastal plain for the area planted. It is grown entirely during the cool season of fall, winter, and early spring. It is grown almost entirely in frames covered with cotton cloth, though some use glass sashes. Some of the larger growers use steam-pipes to heat the frames on very cold nights, and have irrigating pipes above the frames for watering. Two crops are grown, one being cut about the last of November, and the other, set at that time, is marketed in March and April. The lettuce that is cut the last of November is followed by beets for the early spring market, and these by cucumbers and

second-crop potatoes till time to set lettuce again. In this way the soil is kept growing something every day in the year, and as this intensive work costs heavily to prepare the frames and to manure as heavily as this sort of cropping requires, so the profits are correspondingly larger than the more extensive work of the open field, and it is not rare to get $3,000 an acre from the winter lettuce-growing.

KALE AND SPINACH.

These are sown in the early fall for shipment as greens during the winter and early spring. A very severe winter North which kills these crops there will at times make the kale and spinach crops very profitable. Kale, being the hardier and more productive, sells for a lower price than spinach, but as both are cheaply grown and only occupy the land during the cool season, and enable the trucker to keep some hands at work ready for the spring and to take care of the lettuce frames, the greens crop is usually fairly profitable, and some think that in seasons when the shipping is not profitable it pays to grow these crops merely to turn under in the spring.

STRING-BEANS OR SNAPS.

These are very largely grown by the market-gardeners, and, when early, they pay very well, as they are cheaply grown, need light fertilization and are out of the way in early summer, so that a hay crop of peas and crab-grass can be grown on the same land, the dead bean tops helping to fertilize the land. Muskmelons are sometimes planted between the rows in alternate rows and the bean vines turned under for their benefit after the beans are shipped, and these followed by a volunteer crop of crab-grass hay or by the second crop of Irish potatoes, for no market-gardener is satisfied with less than two crops annually on his land, and often gets three or four, for the second-crop Irish potatoes can be at once followed by the early cabbage crop from plants set in December.

ENGLISH PEAS.

The early crop of English peas is a very important one to the market-gardener in eastern North Carolina. The main crop of the extra earlies is usually sown in January and goes to market late in April and early May. Single growers will often plant a hundred acres in peas. They are a cheaply-grown crop and are soon off the land, and the vines turned under are valuable for the improvement of the soil and can at once be followed by some later crop, such as cucumbers or melons.

CELERY.

This crop is not as yet very largely grown in the eastern trucking section, but it can be made a very profitable crop on the peaty re-

claimed swamp lands by planting in the late fall so as to have the crop come in in the later spring months after the Northern crop is over. In the moist bottom-lands of the piedmont section celery grows finely, and in the cool valleys of the mountain country it attains a quality far superior to the big pithy celery that is so largely grown in Michigan and shipped over the country. The home markets of the State and of the Southern cities in general are poorly supplied with fine celery till the late crop from Florida comes in, and a very profitable industry could be added in the mountain country in growing celery for the home and Southern markets in winter. It is an expensive crop to grow, and the gardeners in the eastern section find it more profitable to devote their attention to the lettuce crop.

CUCUMBERS.

The cucumber crop is getting to be a very important one to plant in the cloth-protected frames as the lettuce is cut out and shipped, and, being protected there from late frosts, it comes on early and the crop is shipped North till the price falls, and then the growers have immense tanks, holding about fifty barrels each, in which the remainder of the crop is put into brine and later sold to the picklers, and the second-crop Irish potatoes occupy the land till time to set the lettuce again for the spring crop. A thousand bushels per acre is a common crop of cucumbers.

MUSKMELONS OR CANTALOUPS.

These are sometimes grown in the same way as the cucumbers to get an early crop, but are commonly planted in large areas following a crop that is taken off in early spring or planted while that crop is still growing. Only the very early varieties of small size, like the Netted Gem or Rocky Ford, are grown, as these are more in demand than the large kinds and are easily packed in crates.

CAULIFLOWERS.

These, like the early cabbages, are set in the fall, but are not so largely grown. Sometimes they are set in the frames and the remaining space filled in with lettuce and the cauliflower given the full room as the lettuce is cut out. Grown in this way, they come into head in March and can be made quite a profitable crop.

TOMATOES.

Tomatoes are not largely grown by the market-gardeners in the eastern section. When the plants are forwarded under glass and set early, so that the first fruits ripen the first of June, they can be profitably shipped; but later the crop is seriously damaged by sun-scald and the plants are liable to blight. Hence, the crop is not there considered a profitable one. In the western part of the State, and

especially in the mountain country, tomatoes thrive in great luxuriance and of the finest quality, and, if grown there on a large scale, a profitable canning industry could be built up, as the conditions there are more similar to those in the great canning sections northward.

LIMA BEANS.

The general humidity of the climate in the warmer sections of the State forbids success with the navy beans which are grown in the North, but the introduction of the bush forms of the lima bean opens up an opportunity for the profitable culture of these fully equal to that which has been so profitable in California. The beans grown here should be of the small or butter-bean type, as the large limas are unproductive except in the cool mountain valleys where the conditions more nearly resemble those of the North.

ONIONS.

Onions are largely grown for bunching and shipping as green onions, and this culture can be made very profitable, since the sets planted in the fall will be ready in the eastern section for market, often in February, and always in March and April. The yellow potato onion can also be profitably grown as a ripe onion, as it comes in from fall-planted sets in the early part of summer, before any Northern-grown onions are ripe, and usually brings very fair prices. In the mountain country the bottom-lands are very well adapted to the cultivation of onions from seed. The finest Prizetaker onions we have ever seen were grown near Asheville and brought to a Farmers' Institute at Biltmore some years ago. Seed sown there in frames in winter and transplanted to the open ground later grow to an immense size, such as are often seen in crates at the green grocers' as Spanish yellow onions. But there is no part of the State where good onions cannot be grown the first season from the seed if they are sown early.

ASPARAGUS.

This is an important crop to the truck growers of the eastern coast section, where on warm sandy soil the crop comes early and brings a fancy price in the Northern markets. North Carolina asparagus is a standard article in the Northern markets and is a profitable crop when well grown. But asparagus for home use and home markets can be grown all over the State, and the local markets are rather poorly supplied and offer a good market for many sections of the State.

BEETS.

Extra early beets are grown in the lettuce frames following the cutting of the November crop of lettuce. They are also grown to a

considerable extent from seed sown in February in the open ground, which make beets for bunching in May.

WATERMELONS.

These are grown, of course, in all parts of the State, but for Northern shipment mainly in the eastern and lower piedmont sections. On light sandy soils the crop is usually a profitable one, both for shipping and for the home market, and melons of immense size and fine quality are produced.

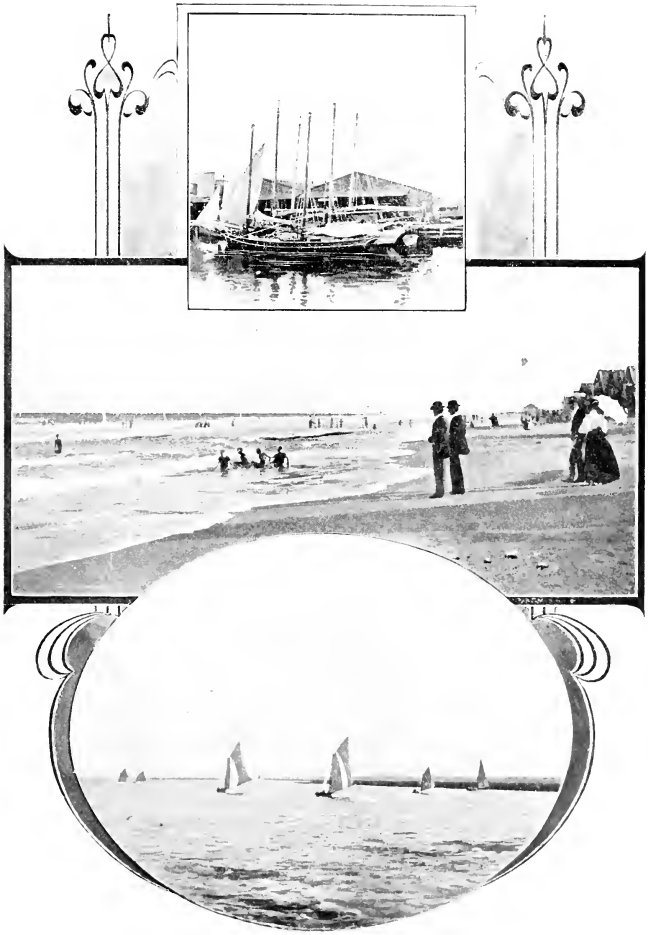
CLIMATES.

We say climates rather than climate, for in North Carolina there are various climates.

In the high plateaus of the northwestern part of the State, where the forest growth is white-pine, hemlock, and fir, one might imagine himself in Canada. In this section—the counties of Ashe, Alleghany, and others—the farms lie generally over 3,000 feet above the sea-level, and grass and live-stock are the leading interests. From these lofty elevations the State slopes to the sun and the sea, and there is a series of climates all the way to the lower coast, where we find the first tall palm-tree growth in the forest. From white-pines and hemlocks to palms indicates a wonderful range of climate, and hence a wonderful range of capacities for the production of different crops, from the blue-grass of the northwestern corner to the palms and sugar-cane of the southeast section.

THE MOUNTAIN SECTION.

This is the region west of the great escarpment of the Blue Ridge, in which are found the highest mountain peaks east of the Rocky Mountains. It is a region of fertile valleys and elevated plateaus, with a climate very similar to that of the Northern Middle States. The summers are cool and pleasant and the whole region is an attractive one to the summer visitor and is becoming a great summer resort. The winters are cold, but shorter than those of the Middle States North. In most mountain regions the mountainsides are rocky and sterile, but in the mountains of North Carolina, as a rule, the mountain slopes are covered with fertile soil and in some parts of the mountain country the treeless "balds" have their slopes to their lofty tops covered with fertile soil and rich grasses, on which great herds of cattle are grazed in summer. The valleys in the southern section of the mountain country are less elevated and the climate is mild and pleasant, while the snowfall is very light. The clear streams of water that flow everywhere and the natural growth of fine grasses mark this region for cattle and the dairy, while on the uplands fruit of all kinds flourishes as it seldom does elsewhere. It is destined to be the most noted apple-growing section in the whole country. Apples from the mountain country have twice carried off the first prize at the Madison Square Garden in New York City in competition with the whole United States. Peaches attain a color and quality there which they do not reach in the lower country. They grow as handsome as the California peaches, and as to quality the California product is hardly to be named in comparison with them.



On the Atlantic Beach, Wilmington.

In short, the mountain country is admirably adapted to dairying and fruit-growing and homes—

> "Where the wing of life's best angel,
> Health, is on the breeze."

THE PIEDMONT SECTION.

This section properly extends from the foot of the Blue Ridge to the line of hills some hundred or more miles eastward, which make the falls of the rivers that run from the mountains to the sea. This eastern limit is a series of elevations rising in some places to over 1,000 feet above the sea and known by various names, as the Uwharrie Mountains, Hickory Mountain, Occoneechee Hills, and Rougemont, and it extends from the South Carolina line to the Virginia line. Between this line of hills and the Blue Ridge is a rolling country of hill and dale and river and valley, with their fertile bottom-lands. In this section the two tiers of counties south of the Virginia line are mainly devoted to the production of the famous gold-leaf tobacco, which is produced in North Carolina better than elsewhere. Southward of these counties the leading crop is cotton. The whole section is evidently naturally fitted to diversified farming, with grass, grain, and cotton, with cattle to consume the abundant hay crops that can be produced. The climate of this region, sheltered from the northwest blast in winter by the high mountains west, is far milder in winter than the mountain country west of the Ridge. The snowfall in winter is light—even lighter than the sections east of it, because of the lesser humidity of the climate—and there is hardly a day in winter when farm work in the soil cannot go on. The soils of this section are largely the result of the decomposition of granitic rocks forming the deep beds of blood-red clay. Here and there this red clay is overlaid by a gray and lighter soil, the tobacco soil of the country. The red-clay lands are admirably adapted to the cultivation of wheat, and when well improved grow great crops. On the red-clay soil of this section the late Governor Holt made on an 80-acre field 46½ bushels of wheat per acre, and the same well-improved farm makes great crops of cotton, corn, and hay. Thousands of acres of similar lands are waiting for the systematic farmer to go to work to bring out their capacities. There is no section where deep plowing and subsoiling produce greater results than on these red-clay uplands, for the piedmont red clay is all good soil down to the fast rock, when once aerated and frosted by the winter, and there are thousands of farms nominally worn out that only need a man with energy enough to break into the fertile farm that lies right under the scratch made by the little one-horse plow of by-gone days. With careless cultivation and shallow plowing these hills are apt to wash into gullies, but with deep plowing and proper level and shallow culture there is less danger of this. With one of the most delightful of

climates and blessed with health, there is no reason why the surplus lands of this section should not become the homes of many thousands more successful farmers than now, when the large farms are divided up and properly cultivated. The main line of the Southern Railway runs through this section, with branches east and west in all sections, so that railroad transportation is excellent. At almost every station one sees cotton mills in operation, and at High Point, a town which has grown in the past fifteen years from a hamlet of 300 people to a city of over 7,000, there is the largest woodworking industry in the whole South. All these factories are taking men who were formerly on the farms, and are opening markets in all sections for garden and farm products to feed these people, for every cotton mill means quite a village to be fed by the surrounding farms. The piedmont section is a high rolling plain, rising from an elevation of about 600 feet on its eastern border next the hills to about 1,500 feet at the foot of the Blue Ridge Mountains. It has the finest water-powers of the State, which are slowly being utilized for manufacturing and electrical power for the cities around. The soil is naturally good and retains the improvement that is easily added by good farming. Its chief lack is farmers—men who will take up and make homes and improve the surplus lands, which as yet are low in price, but rapidly advancing.

THE CENTRAL SECTION.

This comprises the undulating country extending from the hills that mark the outline of the piedmont country proper to the falling-off of the uplands to the level coastal plain. This is sometimes called the lower piedmont. In general character of soils it resembles the true piedmont country, but the soils are more generally sandy and gravelly over the red clay, though in many sections the same red clay forms the surface soil. From its lesser elevation the winter climate is slightly warmer than that of the upper piedmont section. On the southern end of this section we come to the great long-leaf pine belt, the sand-hill region, which, beginning in North Carolina, runs southwest through South Carolina, Georgia, Alabama, Mississippi, Louisiana, and into Texas, an extended region of sand-hills supposed to be the ancient dunes of the seacoast when the lower country was not elevated above the Atlantic. This was for generations regarded only for its product of turpentine and tar, and later for its lumber. But of late years it has grown into a region for winter resorts, at first by consumptives, who found the balmy air and dry soil favorable, and many of whom, finding that they could live in comfort there and could not do so in the North, settled permanently and built up the town of Southern Pines. Making homes there, these people naturally wanted to grow something. The deep sandy soil had always been considered too barren for any cultivation. But it was soon found that with proper fertilization the soil was admirably adapted

to the production of fine grapes. Later on, large enterprises were started in the cultivation of peaches, and now immense vineyards and orchards are found in various sections, and their number is increasing, as the cultivation of the peach especially has been found profitable. Later on, the sand-hill country attracted the attention of Mr. Tufts of Boston, who assumed that the mild winter climate and the pure water would make a resort for people who were simply tired and not sick. He therefore built the town of Pinehurst in the midst of thousands of acres of pines, and it has grown into a very popular winter resort, as consumptives are excluded. There are a number of hotels of different sizes and prices, and many cottages that are rented, and the visitors in winter now number thousands. At Pinehurst, too, out of the needs of the winter guests, there has been developed the fact that winter forcing in green-houses under glass could be made a very profitable part of the horticulture of this section. The surplus cucumbers from the Pinehurst forcing-houses have sold during the past winter in Raleigh at fifteen cents each. With our abounding sunshine in winter, the forcing of vegetables and small fruits in hot-houses can be made far more profitable than in the North because of the greater sunshine and less amount of coal needed. Every gardener knows that sunshine under glass counts for far more than fire heat and costs less. In fact, the beginning made in frames by the gardeners of the eastern section in the winter culture of lettuce is but the entering wedge that will introduce regular winter forcing in North Carolina. The upper part of the central section has for generations been mainly devoted to the one crop of cotton, and, as a consequence of this clean and constant culture and shallow plowing, the hilly lands have washed badly and need protection by terrace banks, at least till by deeper plowing and subsoiling and the rotation of crops adapted to the increase of humus in the soil the inclination to wash is lessened. The soil is naturally easy to improve and to keep up if proper farming is done. Cotton and tobacco will always, probably, be the leading money crops of this section, though on some of the lighter soils the cultivation of watermelons for shipping is increasing. Fruits for home use can be easily grown, but the conditions outside the sand-hill country are not favorable to commercial fruit culture. But the climate favors the production of the finest forage crops in the form of cow-peas, soy-beans, and alfalfa. Alfalfa has been very successful in this section, and its cultivation is rapidly extending. Few cattle have been kept in this section heretofore, but with the increase of forage crops there will naturally come more attention to stock. The markets in the towns and cities are not well supplied with butter of fine quality, and there is a constant demand for beef in the larger towns, a part of which has to be supplied from abroad, though as good beef can be grown here as anywhere, with the proper attention. The winter climate is peculiarly mild and less humid than that of the coast plain. Occasionally the temperature in cold waves

falls down in the teens above zero, but the mean winter temperature is far above the freezing point and zero is unknown. This section was originally covered with a vast forest of oaks, remnants of which are still found here and there in giant trees, especially in the capital city of Raleigh. But the second growth following the destruction of the original oak forest is largely of pine, which has been Nature's cure for man's waste. All the section north of the sand-hills is well adapted to general farming with grain in rotation with peas and cotton, and with good farming there is no money crop in the United States that can compare in profit with cotton. Good farmers in this section can make a bale or more of cotton per acre, though the general average is much less. Northern men coming South are too apt to want to ignore the cotton crop, thinking that the deterioration of the soil has been due to the culture of cotton, when in fact there is no crop that makes a lighter demand on the soil when properly cultivated in a good rotation, and none that admits of a more rapid and profitable improvement of the soil through the growing of legumes and the feeding of live-stock. In this climate the expensive barns of the North are not needed to protect cattle, for they can run out most of the time and find pasture, except in the coldest weather, and then open sheds furnish all that is needed. As has already been stated, on all the red-clay soils of the State the *Lespedeza striata,* known as Japan clover, has spread and furnishes an admirable summer pasture on lands otherwise waste. Mr. French, who came and settled in Rockingham County from the blue-grass pastures of Ohio, and has gone into the breeding of Polled Angus cattle with great success, stated recently in a public address that he found that the Japan clover gave him a better pasture than the blue-grass in Ohio, for it is at its best in the hot weather of summer when the blue-grass is parched and dried. With abundant summer pasture and the wonderful forage crops that can be grown for hay in the shape of cow-peas, vetch, and soy-beans, it should be an easy matter to raise the finest of cattle in all the upland country of North Carolina. County after county in the piedmont section is being cleared of the fever ticks and being admitted north of the National quarantine line, and as this is done the raising of cattle for the Northern trade is becoming more profitable. For general grazing the grassy plateaus of the northwestern mountain section are equal to any in the whole country, and thousands of cattle of high grade are now raised there and sent west as feeders, the great elevation of the farms there precluding the profitable cultivation of corn. But in all the southern part of the mountain section the milder climate admits of wonderfully fine crops of corn, while the mountain balds furnish the summer pasture, and the markets southward for the finished cattle are inexhaustible.

THE COASTAL PLAIN.

This section extends westward from the seacoast for a hundred or more miles. It is a level and generally a sandy soil elevated but little above the sea and blessed with a winter climate of peculiar mildness from the proximity of the gulf stream, whose warm waters skirt the coast to Hatteras. In this section are found the great swamps or pocosons extending from the Great Dismal Swamp on the Virginia line to the southern extremity of the State. In this section cotton was for many years almost the sole crop, but in recent years the cultivation of tobacco has largely extended. But the greatest development, as we have seen, is in the great market-gardening industry that has sprung up and is rapidly growing both in the culture of vegetables and of small fruits, especially the strawberry. The Atlantic Coast Line Railroad runs through this section, and, with its branches, furnishes rapid transportation for the perishable products of the gardens. With a climate that is below the freezing point in winter only occasionally, the work of the farm and garden can be carried on continuously, and with the intensive methods we have mentioned the winter cropping is becoming a feature of great importance. Where the lands adjacent to the great swamps have been drained they have been found of great fertility. In Hyde County many years ago the cutting of a canal from Lake Mattamuskeet to the Pamlico Sound opened up a body of land surpassing in fertility the black prairies of the West, and all over this section there are bodies of black and fertile soil underlaid by a compact clay which makes them retentive of any improvement that is applied. In addition to the development in the market-gardening line there has, in this section, grown up an allied industry which is unique in its way and found nowhere else in the country. This is the cultivation of flowering bulbs for the Northern florists. It was found years ago that the soil and climate were peculiarly adapted to the production of the tube-rose bulbs. These are grown there to such perfection that a limited section along the Atlantic Coast Line, centering at the town of Magnolia, now supplies all the tube-rose bulbs for the Northern and European markets. Of late years the tube-rose growers have turned their attention to other flowering bulbs and tubers, and there is a large acreage now devoted to the gladiolus, canna, caladium esculentum, dahlias, narcissus, and Roman hyacinth, and it is believed that the lily known as the Bermuda lily, and which is now imported in immense quantities from Bermuda, can be profitably produced there. Experiments in this line are in progress. Bulbs are also being produced on Roanoke Island, and the industry is extending. The level character of the soil of this whole section, the absence of rocks and hills and the generally light nature of the soil render cultivation easy, and, while there are poor and sandy soils, the general character of the soil is one of great natural fertility.

On the moist black lands grass grows spontaneously and in great variety, and on the heavily manured lands of the trucking section wonderful volunteer crops of hay are made from the crab-grass after an early crop of vegetables has been shipped, and here, too, the cow-pea, "the clover of the South," flourishes as it does nowhere else. Cattle winter without any care at all in the great swamps, feeding on the evergreen reeds of the cane-brakes, and come out in the spring in good order and are soon ready for market. Many hundreds of the common scrub cattle of the section are thus pastured in winter, and with improved cattle and the abundant forage that can be grown there should grow up an export trade in cattle raised right near the ports from which they are shipped.

CATTLE AND DAIRYING.

There is a gradual improvement in cattle in all parts of the State. In that part of the mountain section where stock-grazing has long been the leading interest the short-horn blood prevails, and most of the cattle show evidence of a short-horn cross. In the neighborhood of the cities there is an increase of attention to the dairy, and some are making great success with it. For this purpose the Jersey and Guernsey cattle and their grades are used, with here and there some Holstein blood. For beef cattle in the piedmont section the Polled Angus cattle are taking the lead and have been found well adapted to the section. But there is great room for more improved stock and more improved methods of stock-feeding and dairying. Butter can be produced here more cheaply than in the North and sells for a higher price, while the city markets are as yet poorly supplied all over the South, and get a great part of their supplies from the North and West, all of which could be profitably produced here.

SOMETHING ABOUT THE SCUPPERNONG GRAPE.

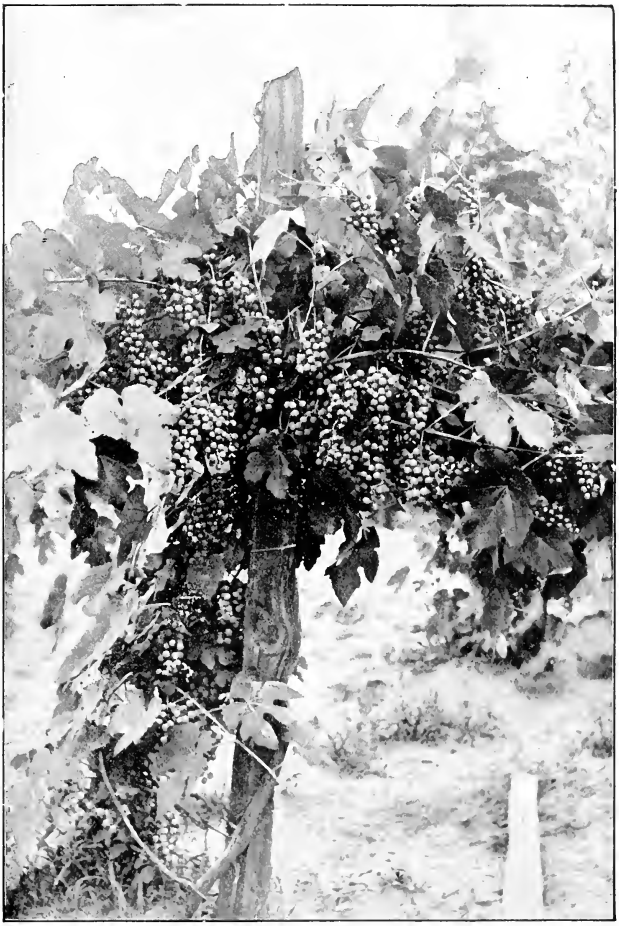
A Fine Wine Grape that Promises Much as an Investment—Best Returns for Outlay of Any Crop.

The Scuppernong will grow and produce grapes on any of the sandy lands of eastern North Carolina.

Cuttings may be secured in great quantity by taking any Scuppernong vine and letting it fall on the ground in June and throwing a few shovelfuls of dirt on it at from two to three feet from the outer ends of the limbs. These take root quickly in the fresh earth, and can be taken up and cut off any time from November 1st to March 1st, and set out. Care should be used in selecting thrifty vines with nice grapes, as the vine reproduces the kind. Seedlings are not worth planting, as you do not know what kind of grapes they will produce.

The land should be laid off in rows twenty feet apart, the vines being set out twenty feet apart in the rows, and planted true and square. A good post standing out of the ground not less than seven feet should be set to each vine. These should be of cedar, oak, or lightwood, as the setting of new posts cuts the roots off the vines. A good cutting will reach almost to the top of the post in one year, if properly cared for. The best method is to wire the vines. When this is done rows of posts, well braced, have to be set out around the edge of the vineyard, to which are attached the larger wires. Down each row a No. 10 galvanized wire is run as a governor wire, and stapled to the top of each post. Across these governor wires you stretch at first one No. 14 wire. If well braced at the ends this gives all the posts secure bracing. As the vines grow and spread out, you add on each side of the No. 14 wire other wires, always keeping good arbors for the vines to run on. The vine should not be allowed to bunch up in knots, but be kept spread out and growing uniformly in all directions. It takes 108 vines to set out an acre properly laid off.

The land should be cultivated with leguminous crops, and the vines kept free from trash around the roots, which grow close to the top of the ground. Do not cultivate under the branches, as the roots extend and draw sustenance as far as the branches run. Hence, if you plow close to the vines, you tear up the roots. The best method we know is to keep the roots, all around the body of the vine and as far as the branches extend, mulched with a heavy coat of leaves and straw. The home of the vine is in the piney woods, where, in the rich virgin soil, it spreads hundreds of feet. The best vines we have ever seen were in old garden plots where they were never plowed, but the weeds kept down. A good plan is, perhaps, to have sheep graze under the vines; but the best plan is to keep in cultivation the



Grapes Grow in Profusion Everywhere.

land not shaded, and to keep the weeds down on the rest by having a heavy mulch. While the vine will grow and produce on light sandy land, yet it should not be expected to get good crops from poor land. The soil should be well fertilized, as for peaches. We do not believe in plowing deeply or close to the vines. It breaks the roots and inevitably damages the vines.

As to gathering, the preferable plan is to gather by hand, and in small vineyards this can be done. But in a large vineyard this is not practicable. Poles are attached to strong sheets made of canvas, each about ten feet square, and with leather handles and a man to each side of the sheet, it is easily carried around between the posts, which are set in even rows. Another man or boy, with a forked stick, shakes the vine gently just above the sheet, and the ripe grapes fall and are caught. Children pick up the few grapes which fall outside the sheet. The vines should not be beaten hard, as not only do you thus get green fruit, but damage the vines by breaking the tender new growth, which produces the crop next year, or most of it. The leaves can be fanned out by a fan-mill or picked out by hand; a fan-mill is best, and can be moved along as you go over the vines. The vines should be gone over as often as the grapes ripen, as you cannot gather all the grapes at one time without getting green or overripe fruit, either of which lowers the grade of grapes.

A word as to profit. An acre will, at three years old, with good care, produce about one ton of grapes. At four years old it should yield from three to four tons of grapes; at seven years from planting the acre should produce from eight to ten tons of grapes each year, and this yield should continue indefinitely, or rather as long as proper care is given the vineyard, as the life of the Scuppernong is more than a hundred years.

The present price per ton of grapes, in good condition, is $25. These find sale at the wineries of this and adjoining States. Were the grapes more plentiful the price would be less, say from $15 to $18 a ton. This will give some idea of the profit to the grower, and when the expenses of setting an acre and maintaining it in bearing condition—a total failure of the Scuppernong crop has never been recorded—are considered, no crop of any kind will give equal returns.

North Carolina has in the coastal region many thousands of acres which would produce this crop, and many farmers would find it a safe investment, and one which in time would lessen the anxieties of declining years, by the annual sales from twenty or more acres in this fine wine grape.

NORTH CAROLINA THERMAL BELTS.

The Great Fruit and Vegetable Zones!—High, Dry, Healthful Region.

More than forty years ago Silas McDowell wrote in the Agricultural volume of the Patent Office Report an article relating his observations in Macon County. He was a man of much intelligence, and had been in youth a companion of John Lyon, the English botanist, exploring with him the Black, Yellow, Roan, Grandfather, and Linville ranges, and caring for him until his death in 1814.

Mr. McDowell was also a companion of Curtis, Buckley, Reinhardt, and Dow, the latter of whom perished among the mountains, and his remains were never discovered. Dr. Gray was in communication with him more than forty years ago.

He wrote: "When I commenced business it was as a farmer in western North Carolina, in a wild valley and amid lofty mountains, and for nearly fifty years my house was an open free home to the scientist, particularly the geologist and botanist (my own specialties). But now the light begins to burn dim in the binnacle, and is nearly out." He died in 1882, at the ripe old age of 87. Honor to his memory!

A description of the phenomena observed by him is given in his own words: "Amongst the valleys of the southern Alleghanies sometimes winter is succeeded by warm weather, which, continuing through the months of March and April, brings out vegetation rapidly and clothes the forest in an early verdure.

"This pleasant spring weather is terminated by a few days' rain, and the clearing up is followed by cold raking winds from the northwest, leaving the atmosphere of a pure indigo tint, through which wink bright stars; but, if the wind subsides at night, the succeeding morning shows a heavy hoar-frost; vegetation is utterly killed, including all manner of fruit germs, and the landscape clothed in verdure the day before now looks dark and dreary.

"It is under precisely this condition of things that the beautiful phenomenon of the 'Verdant Zone' or 'Thermal Belt' exhibits itself upon our mountainsides, commencing at about three hundred feet vertical height above the valleys, and traversing them in a perfectly horizontal line throughout their entire length, like a vast green ribbon upon a black ground.

"Its breadth is four hundred feet vertical height, and from that wider, according to the degree of the angle of the mountain with the plane of the horizon. Vegetation of all kinds within the limits of this zone is untouched by frost; and such is its protective influence that the Isabella, the most tender of all our native grapes, has not

failed to produce abundant crops in twenty-six consecutive years; nor has fruit of any kind ever been known within these limits to be frost-killed, though there have been instances where it has been so from a severe freeze. The lines are sometimes so sharply drawn that one-half of a shrub may be frost-killed while the other half is unaffected.

"This belt varies in the height of its range above different valleys. I will name a case in point. I made my observations in relation to this belt in Macon County, which is traversed by the beautiful valley of the Little Tennessee River lying 2,000 feet above tidewater. Here, when the thermometer is down to 26° the frost reaches 300 feet vertical height. A small river, having its sources in a high plateau 1,900 feet above this, runs down into this valley, breaking through three mountain barriers, and consequently making three short valleys, including the plateau, rising one above the other, each of which has its own vernal zone, traversing the hillsides that enclose them, the first of which takes a much lower range than that of the lower valley, and each taking a lower as the valleys mount higher in the atmosphere, and in the highest one the range of the belt is not more than 100 feet above the common level of the plateau, a beautiful level height containing 6,000 acres of land and lying 3,900 feet above tidewater.

"The country on the Atlantic side of the Blue Ridge sinks rapidly by a succession of long sunny slopes reaching down into the plain or level country. Along these slopes the air is pure and dry, a refuge for the consumptive, as diseases of the lungs have never yet been known to originate among the inhabitants of these dry, fogless mountains, and here also does the grape find a most salubrious climate and congenial home."

Another similar belt is found along the eastern slope of the Tryon Mountain range in Polk County.

Said Dr. L. R. McAboy of Linn, in this county: "The belt along Tryon Mountain is some eight miles long and extends from 1,200 feet above tidewater to 2,200 feet, thus being about 1,000 feet in width. This begins at the very base of the mountain, and extends up till you have attained the full height of the Blue Ridge, say of Asheville, Buncombe County, with an elevation where the belt is most perfect, of about 1,500 feet.

"The observed facts of temperature are truly strange. The mercury falls in summer and rises in winter, when compared with either the top or the base of the mountain, so much so that travelers on the highway through the belt perceive the difference without the aid of a thermometer. This difference is greater at night than during the daytime, being 5° to 10° on the summer nights, and 15° to 20° on winter nights. There is very little dew, generally none perceptible, which accounts for little or no frost.

"The flora is grand. The azalea there, instead of being a shrub four feet high, attains a height of 10 to 20 feet, and exhibits every shade of pink and orange.

"We are in latitude 35°, but for all practical purposes 3° south of our geographical position. The leaves of plants, shrubs, and flowers remain untouched by frost until the latter part of December, and sometimes till the middle of January, when they are killed by snow or sleet. The early spring in the belt admits of planting any vegetables the first of February without risk from frost. Tomatoes, tobacco, and other tender plants remain green until after the middle of December. Fig trees live through the winter unprotected, and bear full crops, while in the valley they are killed to the ground every winter. Grapes never mildew nor rot, and are of large size and delicious flavor. This belt is confined within distinct and well-defined limits, which remain the same from year to year, and in the middle stratum of air or land on the mountainside."

Another writer says: "After a snow-storm not a particle of snow will exist in the belt (it melts as it falls), while the tops and sides of the mountains above, and the valleys below, will be covered."

Prof. John Le Conte said: "I wish to put on record the results of observations made by me many years ago on the 'frostless zones' of the flanks of the mountain spurs adjacent to the valleys in the Blue Ridge. My observations were made at Flat Rock, near Hendersonville, Henderson County, a well-watered, fertile, mountain plateau-like valley, which is about 2,200 feet above the sea-level.

"My own observations, and the information elicited from residents, seem to indicate the following facts: The zones in question are not exempt from frost during the whole of the cold season; in fact, during the winter the ground in these belts is frequently frozen to a considerable depth, but during the spring months they are conspicuously and uniformly frostless."

It seems, then, to be an established fact that, at these three points, in three different counties, there are some noteworthy meteorological conditions prevailing along this belt of 400 to 1,000 feet of perpendicular height, and it seems probable that a similar state of things exists in kind, if not in degree, on all the southern and eastern slopes of parallel mountain ranges in that latitude where protected against wind.

Respecting the explanation of these phenomena, Mr. McDowell theorizes as follows: "Heat is ever radiating from the earth, and in cold, clear, still nights it mounts upward through the cold, damp air, taking from it its caloric, while the latter rushes down in a cold, frost-producing current, and hence the lowest ground in a valley is ever subject to the hardest frosts.

"The warm, dry, light current keeps mounting upward like cork in the water, until it reaches a stratum of atmosphere too thin and light to support it, when it consequently falls back and pours its warm, dry,

genial stratum upon the top of the lower or frost stratum; and hence, on cold, frosty nights, is produced the phenomenon of the 'Vernal Zone.'"

Of course such a phenomenon must be explained in general upon the theory of the nocturnal stratification of layers of the atmosphere, having different amounts of moisture and caloric, of which we so often see examples when the mist settles in the valleys at a given level, which, if the temperature be sufficiently low, would also be the frost line, or when often, on a summer's day, from a mountain-top the white cumuli may be seen stretching away in long lines at a well-defined altitude. But in these cases we have no such visible and exact demarcation of the warmer stratum on its upper side.

Prof. Le Conte, already quoted, says: "The 'frostless zones' *coincide* with the nocturnal and morning 'fog-belts' of the spring months. The uniform pressure of these white circumscribed belts of fog on the flanks of the mountain spurs during the early morning hours imparts a striking feature to the scenery of these valleys. When illuminated by the bright morning sun they appear like girdles of cotton-wool of moderate width, encircling the peaks at the height of 200 or 300 feet above the adjacent valleys; and their cumulus-like whiteness, contrasted with the verdure above and below them, is no less striking than it is beautiful."

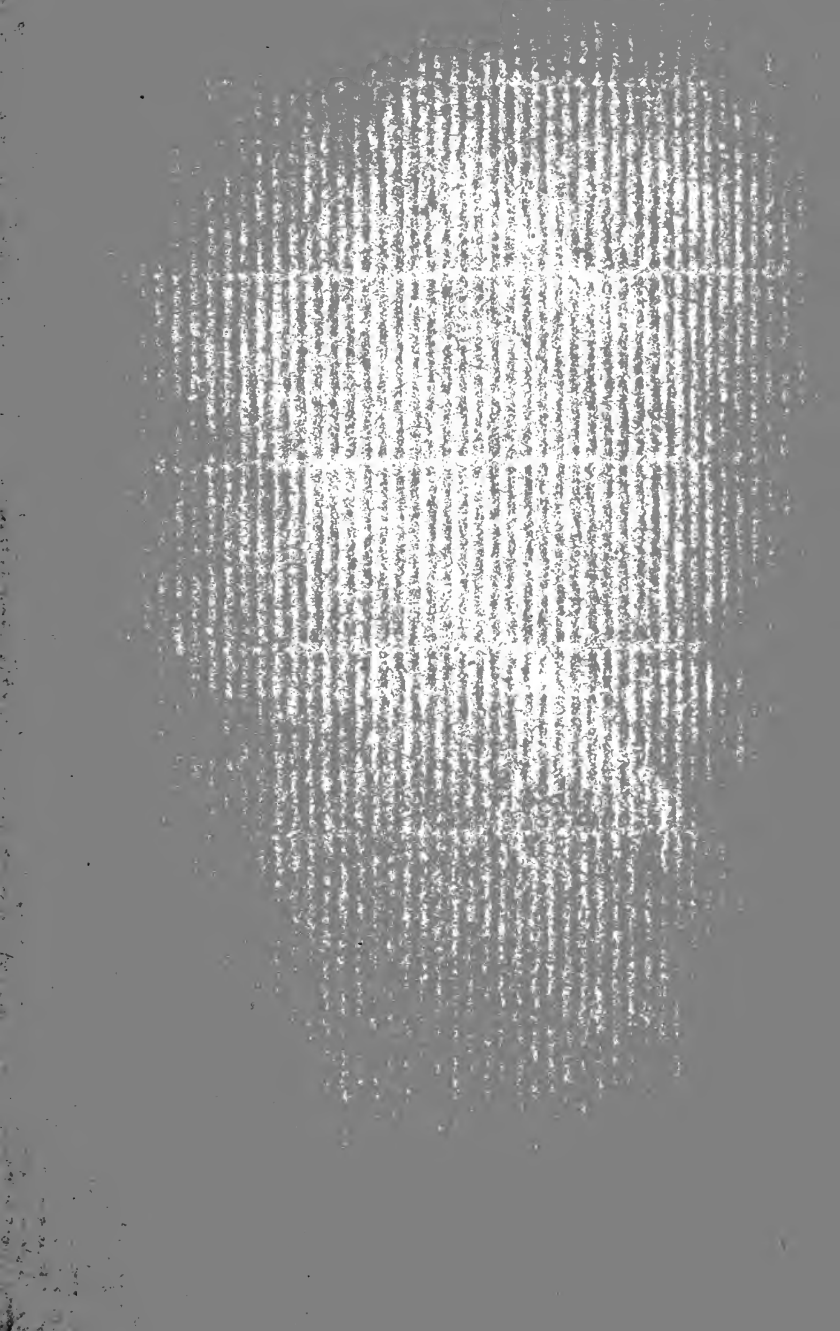
The latter circumstance seems to furnish an explanation of the physical cause of the so-called "Thermal Belt"; for the constant fogs at night and in the morning not only prevent refrigeration by obstructing terrestrial radiation, but, during the condensation of vapor in the process of fog-formation, there must be developed an enormous amount of heat just at this zone. Why this condensation of aqueous vapor should be so persistently restricted to a belt of only a few hundred feet in vertical thickness is a question much more difficult to answer. The observations of intelligent residents of the mountain valleys in the southern divisions of the Appalachian chain will doubtless verify or disprove the general *coincidence* of the "frostless zone" with the "fog-belt."

This piedmont region, not merely that section technically so-called, but the zone along and around the southern Appalachians having an elevation from 1,000 to 2,500 feet above sea-level, possesses attractions as regards beauty and grandeur of scenery, fertility and variety of soil, equability and salubrity of climate, not to be surpassed in the Union.

If, in addition, these thermal belts exist and extend generally among those ranges, offering exemption from certain forms of disease, with exceptionally favorable facilities for fruit culture, a knowledge of the facts should be more generally diffused.

These facts point out this region as the best place to be found for the cultivation of celery, cauliflower, tomatoes, and other vegetables for canning; raspberries and strawberries for shipment and preserv-

ing; for peaches, pears, fine apples, cherries, quinces, and currants; also for the finer table and wine grapes. All of these are known to flourish in the mountains and are distinguished for crispness, flavor, and color. Irish potatoes, pumpkins, turnips, beets, parsnips, carrots and the like also grow to perfection.



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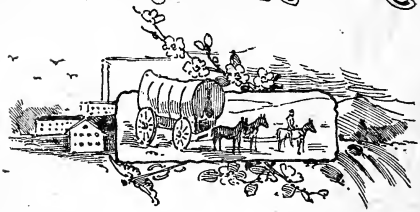

The Products of the Farms the Orchards & the Vineyards

The Forests the Mines & the Factories